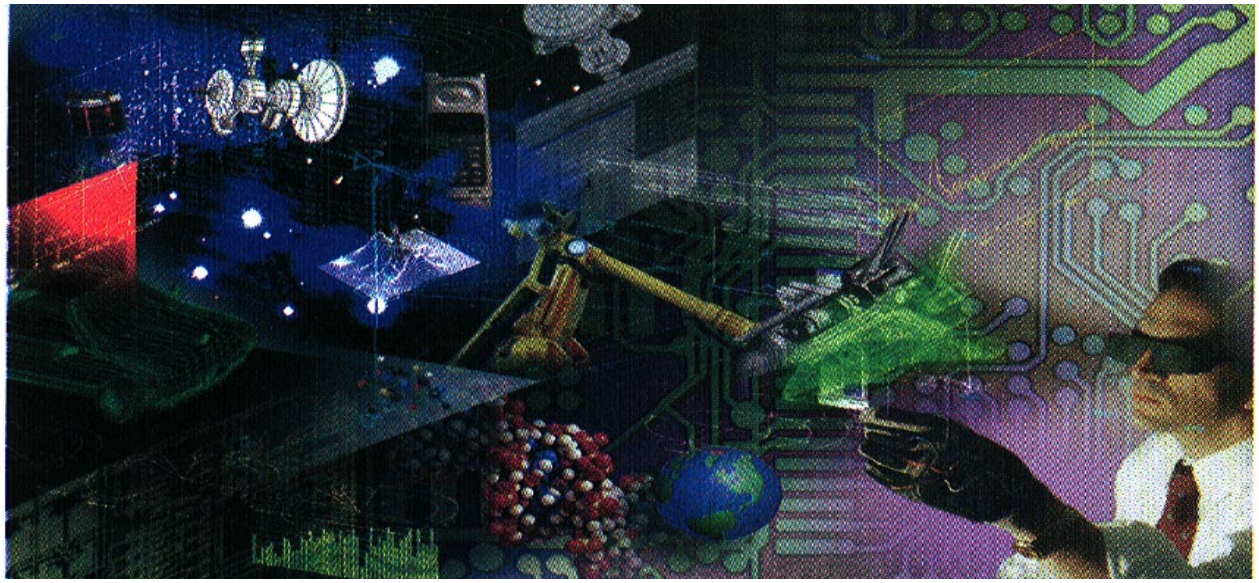
Next Generation Revolutionary Analysis and Design Environment (NEXTGRADE) Program



Next Generation Space Telescope Technology Challenge
July 9, 1997
NASA Goddard Space Flight Center

Presenters: Danniella Muheim, Ronnie Gillian, Jerry Housner

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NASA Langley Research Center
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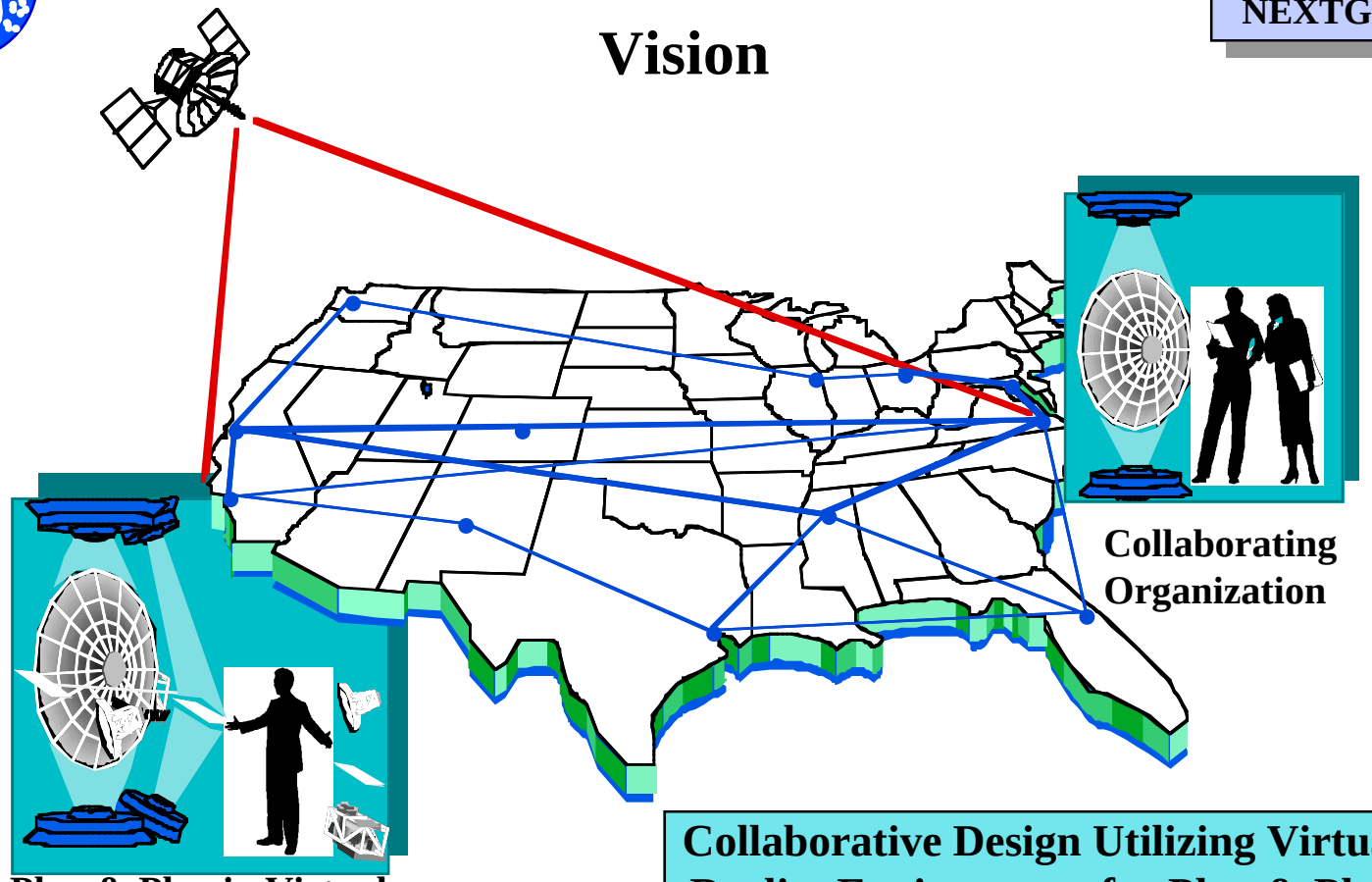
VISION

Pioneer a revolutionary design and analysis environment for future aerospace systems

- **Significantly shorten design and development time**
- **Reduce life cycle costs**
- **Reduce new technology insertion time**
- **Improve performance**

Next Generation Analysis and Design Environment

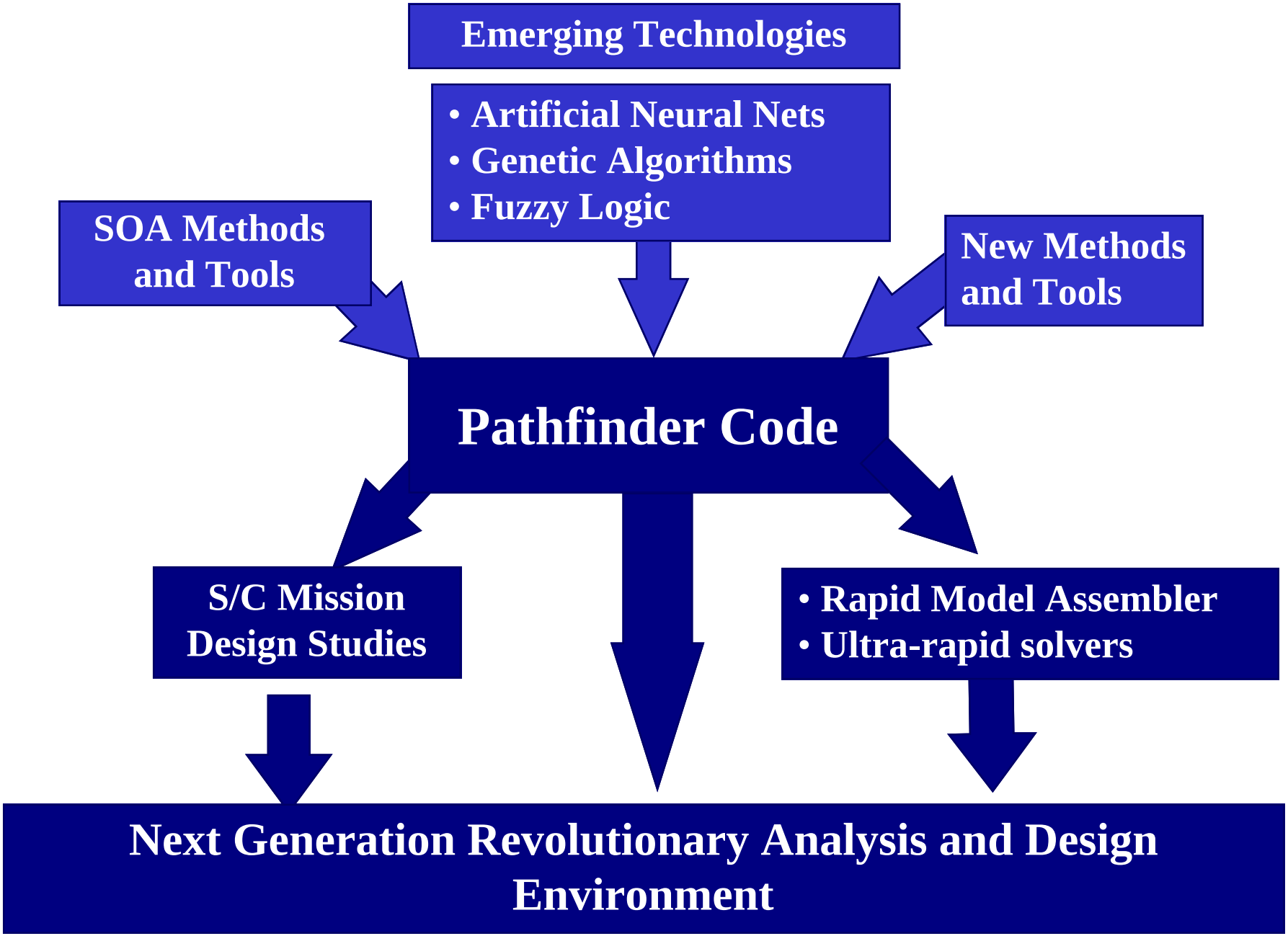
Vision



Collaborating Organization

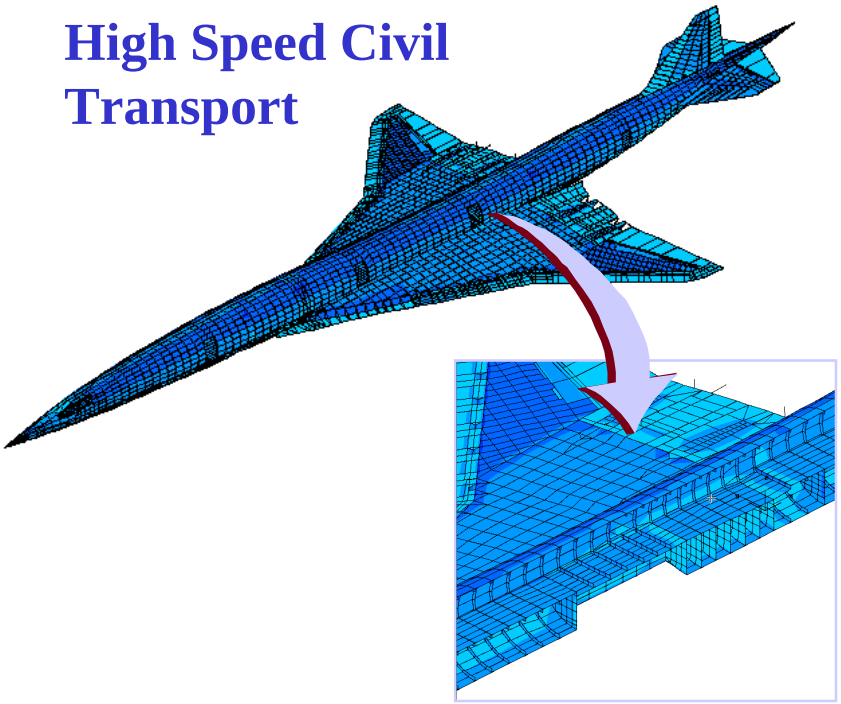
Plug & Play in Virtual Reality Environment

Collaborative Design Utilizing Virtual Reality Environment for Plug & Play Simulation-Based Design

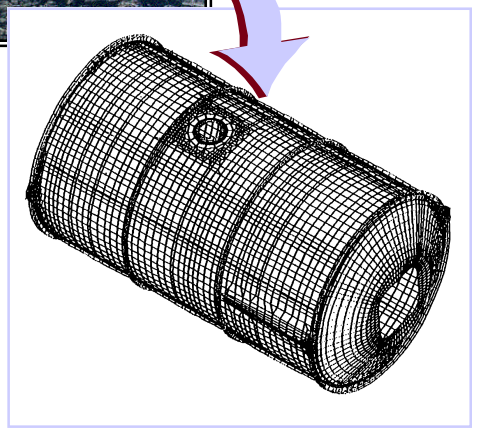

Emerging Technologies
• Artificial Neural Nets
• Genetic Algorithms
• Fuzzy Logic
SOA Methods and Tools
New Methods and Tools
Pathfinder Code
S/C Mission Design Studies
• Rapid Model Assembler
• Ultra-rapid solvers
Next Generation Revolutionary Analysis and Design Environment

CONVENTIONAL FINITE ELEMENT MODELING OF COMPLEX SYSTEMS

High Speed Civil Transport



Space Station



- Requires months to model
- Changes expensive and time consuming

Rapid *Model* Assembler

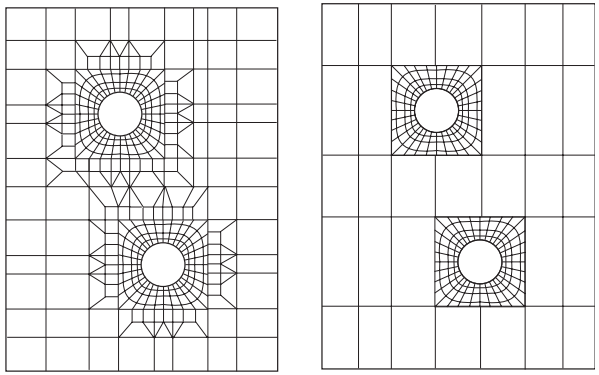
Problem*:** Accurate ***modeling and integration is a tedious long process
***Solution*:**

- Create object-oriented library of part ***models***
- Assemble spacecraft ***models*** using library of part ***models***
- Select part ***models*** graphically (point and click) or orally
- Operate on part geometry and ***model*** simultaneously
- Graphically size part ***models*** along with part geometry
- Assemble sized part ***models*** along with sized part geometries

INTERFACE TECHNOLOGY

Provides a Reliable Capability which Enables the Synthesis of Incompatible, Independently Developed, Finite Element Models

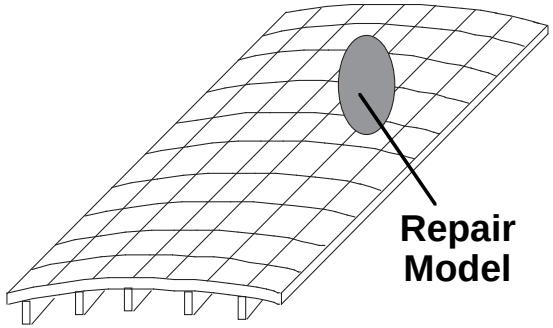
Detail Modeling



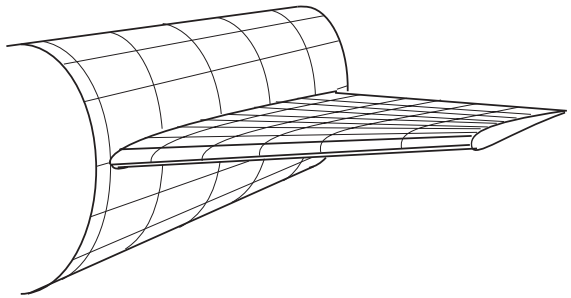
Conventional Technology

New Interface Technology

Repair Modeling



Assembly of Incompatible Models

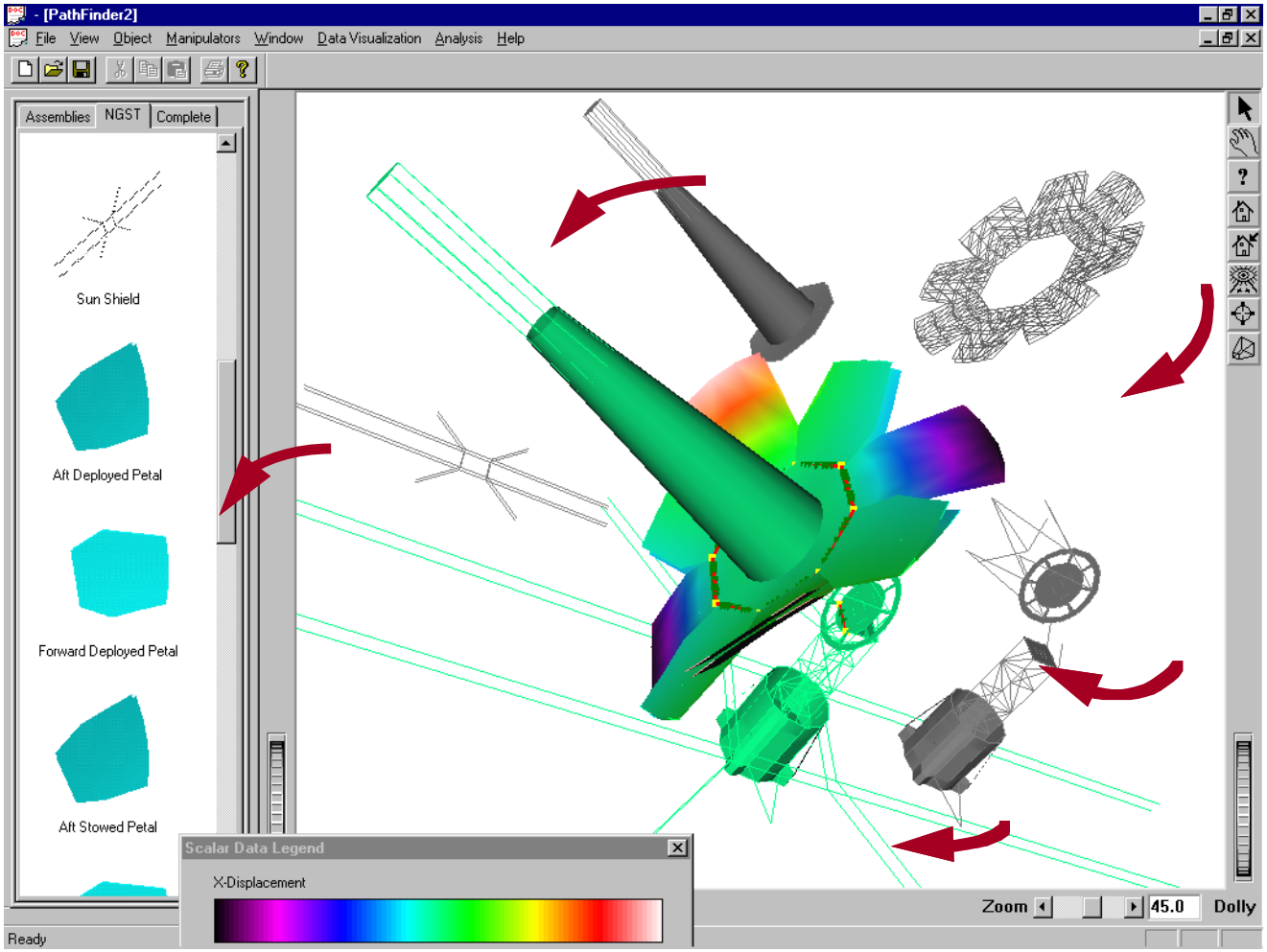


Reduce modeling time

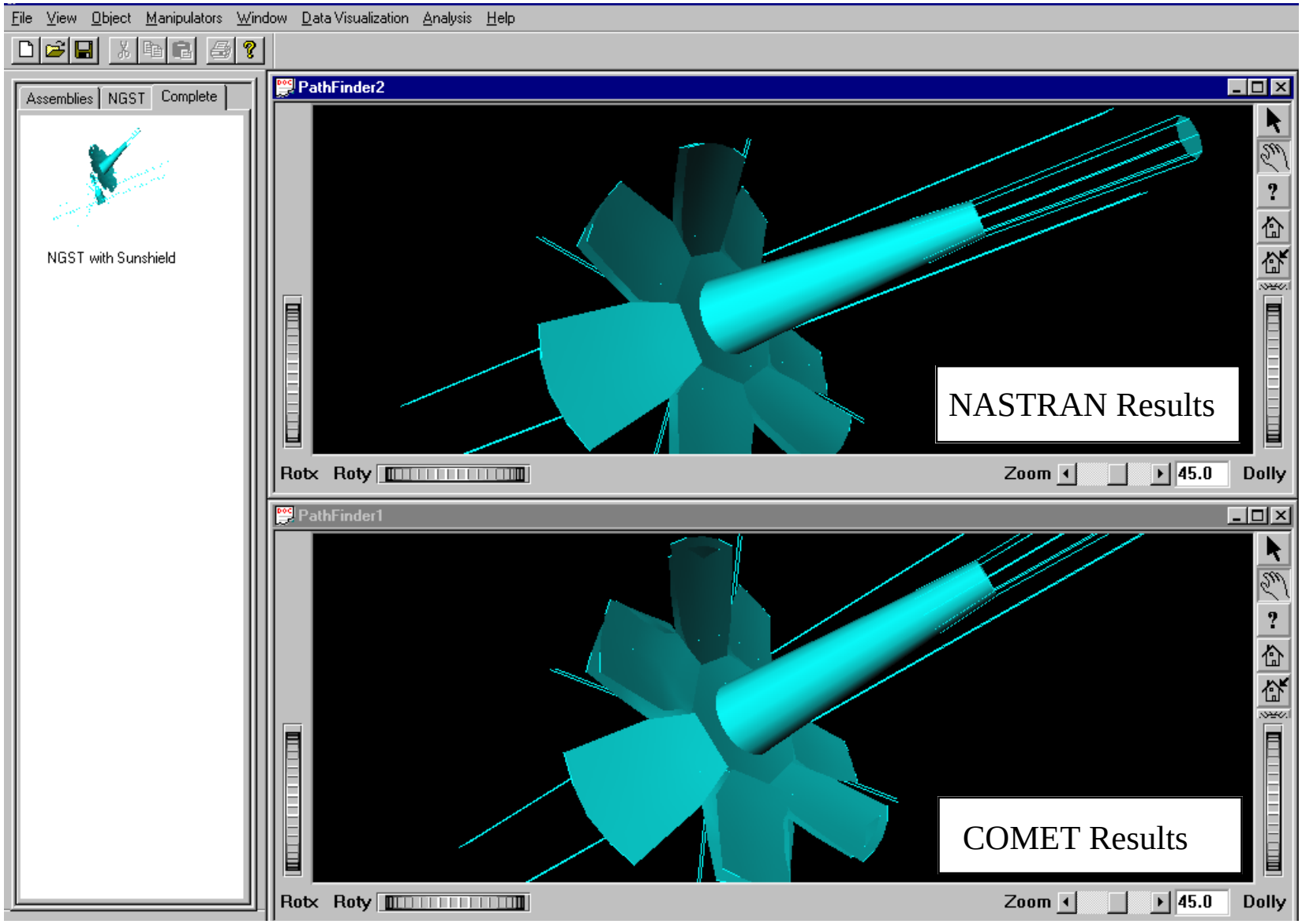
Address safety and life cycle issues

Enable new era of collaborative model sharing

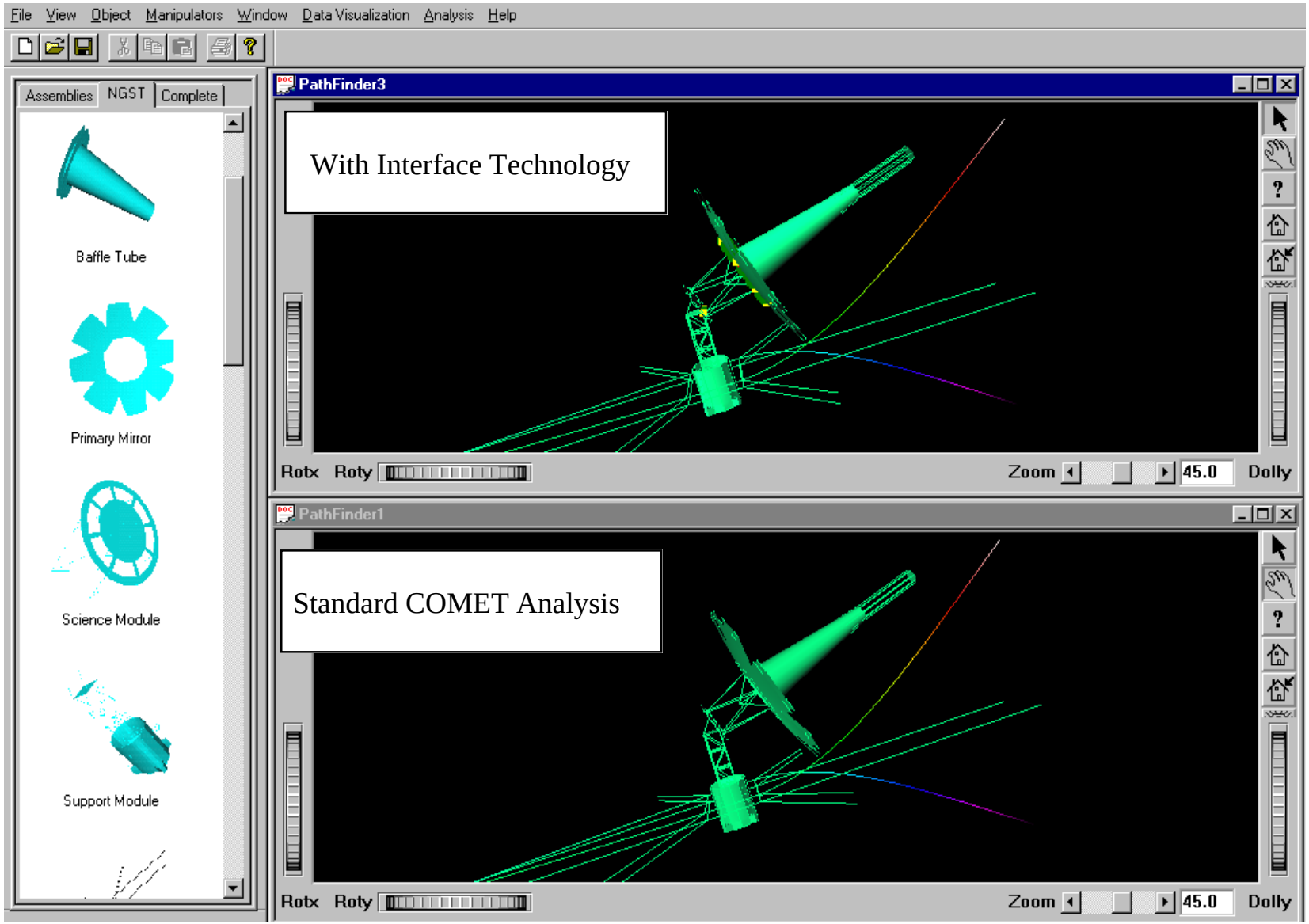
NGST Model Built From Library of Stock Objects



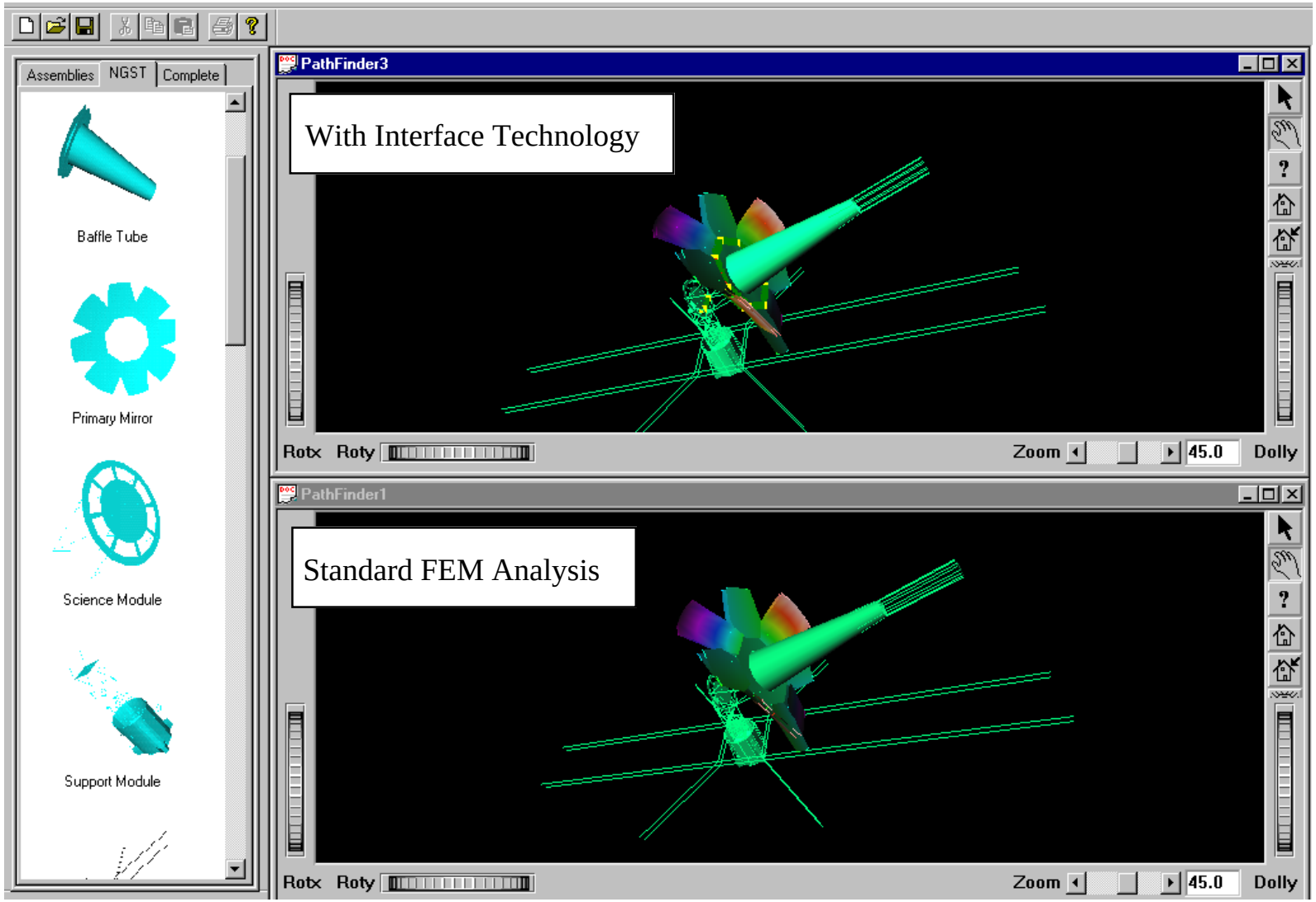
NASTRAN/COMET Comparison



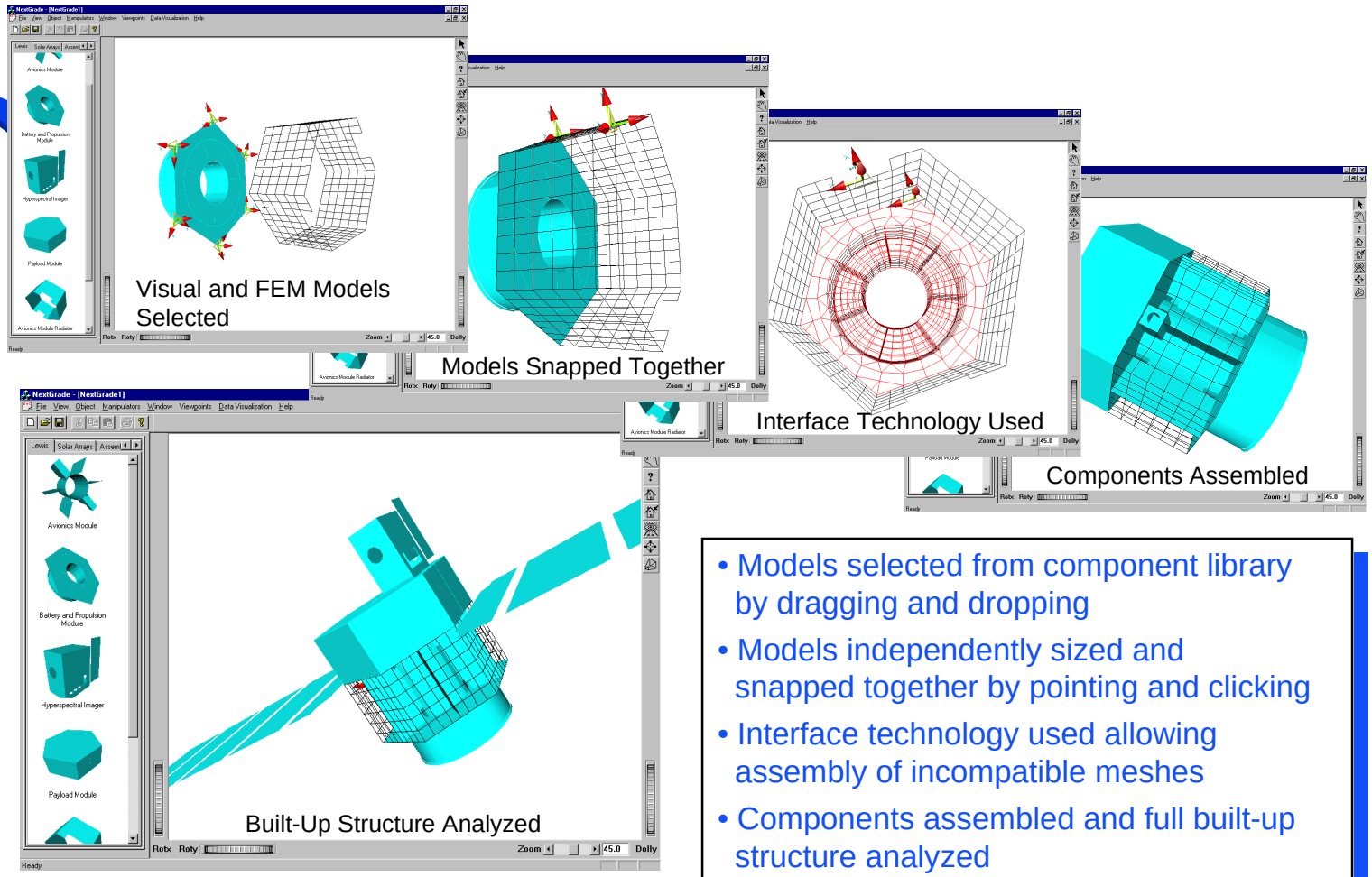
COMET Comparison with Interface Technology



Comparison of Standard FEM Analysis with Interface Technology



RAPID MODEL ASSEMBLER DEVELOPED FOR AEROSPACE STRUCTURES



- Models selected from component library by dragging and dropping
- Models independently sized and snapped together by pointing and clicking
- Interface technology used allowing assembly of incompatible meshes
- Components assembled and full built-up structure analyzed

SUMMARY

- **Developing revolutionary computational methods to enable collaborative and immersive analysis and design environment**
- **Implementing and developing rapid modeling and assembly methodology**
- **Developing ultra-rapid methods utilizing computational intelligent concepts**
- **Integrating multi-disciplinary and cross-platform analyses**
- **Methods and tools find immediate application on a broad class of analysis and design applications**